REMARKS

Claims 1-12 are pending in the subject application.

Applicants have amended the specification, including the abstract, to correct typographical errors and to improve the language; claims 1-4 have been amended to more particularly point out and distinctly claim the subject matter of the invention; claims 5-12 have been added. Support for the amendments can be found throughout the specification as originally filed, particularly, support for the amendments to claim 1 can be found at page 2, line 13 to page 4, line 15, and examples 5, 7, and 9; support for the amendments to claim 2 can be found at examples 12-16; support for the amendments to claim 4 can be found at page 3, lines 10-13; support for claim 5 can be found at page 3, lines 4-13 and claim 1 as originally filed; support for claims 6-8 can be found at page 3, second line from the bottom, to page 4, line 3; support for claims 9-11 can be found at page 4, lines 8-11; support for claim 12 can be found at page 2, lines 13-25. No new matter has been introduced.

Applicants request favorable reconsideration of the subject application in view of the amendments and the following remarks.

Specification

The examiner's action required that the abstract of the disclosure be presented on a separate sheet, apart from any other text.

In response, Applicants submit that the abstract of the disclosure was submitted on a separate sheet, apart from any other text. To clarify, Applicants have amended the section heading for the summary of the invention. Additionally, Applicants have amended the abstract of the disclosure and submit it in both amended form and replacement sheet. Thus, applicants

believe that the specification, including the abstract of the disclosure, is in good order.

Claim Objections

Claims 1 and 3 were objected to because of informalities.

In response, Applicants have amended claims 1 and 3 as suggested by the examiner's action. Accordingly, the objections have been overcome.

Claim Rejections – 35 USC § 112 First Paragraph

Claims 1-4 were rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

In response, Applicants submit that claims 1-4, as amended, do not contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors had possession of the claimed invention at the time of filing.

Regarding the steroid sapogenin and 16-dehydropregnenolone analogs, Applicants submit that these terms are defined by the 2 formulae as recited in the amended claim 1. Moreover, the term "steroidal sapogenin" and its analogs are described at page 2, lines 6-9, in the specification, and 16-dehydropregnenolone analogs are described at page 1, lines 6-13, in the specification. These compounds are distinguishable from other compounds to one of ordinary skill in the art, as the E, F spirocyclic structure is the common moieties of steroidal sapogenin and 3-hydroxy-pregn-16(17)-ene-20-one is the common moieties of the 16-dehydropregnenolone analogs. Additionally, examples 1-16 in the specification disclose processes using 4 different steroidal sapogenins as the starting material, including sarsasapogenin, diosgenin, tigogenin, and rockogenin, to make 16-dehydropregnenolone and 3 different analogs, i.e., 3β-hydroxy-5β-

pregn-16(17)-ene-20-one, 3β-hydroxy-5α-pregn-16(17)-ene-20-one, and 3β,12β-dihydroxy-5α-pregn-16(17)-ene-20-one. The specification provides a reasonably representative disclosure of steroid sapogenin or 16-dehydropregnenolone analogs. These examples would lead one of ordinary skill in the art to conclude that the inventors had possession of the claimed invention at the time of filing. Finally, the claimed invention does not define the compound in purely functional terms but with structural properties and formulae. Thus, *Univ. of Rochester v. G.D. Searle*, 69 USPQ2d 1886 (CAFC 2004), does not apply.

Regarding "heteropolyacid" as recited in claim 1, Applicants submit that the term is well known in the art to one of ordinary skill in the art and can be distinguished from other material. A review article by I.V. Kozhevnikov, Chem. Rev. 1998, 98, 171-198, is enclosed to show the common usage of the term and compound. Applicants acknowledge that the term "heteropolyate" is less known, but to expedite the prosecution, Applicants have amended claim 1 to replace the term with two heteropolyates used in the examples 5, 7, and 9, $Na_3[P(W_{12}O_{40})]$, and $(NH_4)_3[P(Mo_{12}O_{40})]\cdot 6H_2O$. In view of the foregoing, Applicants believe that the rejection has been overcome.

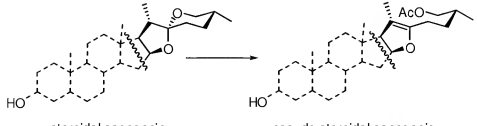
Claim Rejections – 35 USC § 112, Second Paragraph

Claims 1-4 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In response, Applicants have amended claims 1-4 to more particularly point out and distinctly claim the subject matter of the invention. Regarding "analog," Applicants submit that as discussed, *supra*, the term is not indefinite but defined with structural specificity and sufficient

number of representative compounds. Further, examples 1-16 in the specification disclose processes for making 16-dehydropregnenolone or its analogs with sufficient number of representative compounds, *i.e.*, from 4 steroidal sapogenins, including sarsasapogenin, diosgenin, tigogenin, and rockogenin, to make 16-dehydropregnenolone and 3 different analogs, 3β-hydroxy-5β-pregn-16(17)-ene-20-one, 3β-hydroxy-5α-pregn-16(17)-ene-20-one, and 3β,12β-dihydroxy-5α-pregn-16(17)-ene-20-one. The specification provides a reasonably representative disclosure of steroid sapogenin or 16-dehydropregnenolone analogs such that one of ordinary skill in the art would know the metes and bounds of the patent protection.

Regarding "pseudo steroidal sapogenin," Applicants submit that the term is not indefinite to one of ordinary skill in the art, as it is described at page 1, line 14, to page 3, line 5, in the specification. As shown in the chemistry reaction on both page 1 and page 2 (towards the bottom), pseudo steroidal sapogenin is produced at the first step, degradation of steroidal sapogenin. The step of degradation is well known as discussed in the Marker article cited in the specification at page 1, paragraph 4. The Marker article discloses that pseudo steroidal sapogenin(*or* pseudo-sapogenin) is prepared from steroidal sapogenin at 200°C with Ac_2O, and the term has been used as a professional term to represent a class of steroidal with a structure as follows, which have an open F-ring skeleton and a 20(22) enol structure.



steroidal sapogenin pseudo steroidal sapogenin

Accordingly, Applicants believe that the rejection has been overcome.

Claim Rejections – 35 USC § 103

Claims 1-4 were rejected under 35 U.S.C. 103(a) as being unpatentable over Chinese Patent Application Publication 1341603 (Tian publication), in view of Robert Thornton Morrison & Robert Neilson Boyd, Organic Chemistry 486-87 (Morrison publication).

In response, Applicants submit that claims 1-4, as amended, are patentable over the cited prior art and there is no *prima facie* case of obviousness. Applicants submit that the present invention as set forth in the amended claim 1 is directed to a process for producing 16-dehydropregnenolone and its analogs comprising the steps of dissolving a pseudo steroidal sapogenin derived from degradation of a steroidal sapogenin in an organic solvent, adding hydrogen peroxide, and optionally a metal catalyst and an acid, to the pseudo steroidal sapogenin dissolved in the organic solvent and reacting at 0-80℃ to form a mixture, and adding a base to the mixture and keeping the mixture at 0-100℃ or in reflux for 0.5 to 2 hours to give 16-dehydropregnenolone or its analog. The steroidal sapogenin and 16-dehydropregnenolone and its analogs are defined in the formulae, and the molar ratio of the pseudo steroidal sapogenin, hydrogen peroxide, the metal catalyst, and the acid is 1:(1.0-4.0):(0.001-1):(0-1). The base used in the claimed invention is a hydroxide, a carbonate, or a bicarbonate. As acknowledged in the examiner's action, the Tian publication does not disclose adding a base to the mixture and keeping the mixture at 0-100℃ or in reflux for 0.5 to 2 hours to give 16-dehydropregnenolone or its analog as set forth in the claimed invention.

The missing teaching is not supplied by the Morrison publication. The Morrison publication merely discloses alkaline hydrolysis of esters in general. The Morrison publication does not relate to a process for making 16-dehydropregnenolone and its analogs from steroidal sapogenin. It has been well established that the fact that a claimed species or subgenus is

encompassed by a prior art genus is not sufficient by itself to establish a prima facie case of obviousness. *In re Baird*, 16 F.3d 380, 382, 29 USPQ2d 1550, 1552 (Fed. Cir. 1994). The hydrolysis of acetates at the 3-position required in the process for making 16-dehydropregnenolone and its analogs is not concerned at all in the generalized disclosure of the Morrison publication. One of ordinary skill in the art would not apply alkaline hydrolysis of esters, given no reasons provided by the Tian publication and the Morrison publication to do so, to the process for making 16-dehydropregnenolone and its analogs.

Applicants submit that the hydrolysis of acetates at the 3-position is a concomitant reaction that only occurs in the presence of a strong base. The step of adding a base in the claimed invention increases the nucleophilicity of O-atom (from H_2O to OH^-) and promotes the transformation of epoxide to 1,2-diol. The step of adding a strong base in the claimed invention significantly accelerates the reaction and provides a clean process with complete conversion and simple workup. The Tian publication, either alone or in combination with Morrison, does not disclose the step of adding a base to the reaction mixture in the process of making 16-dehydropregnenolone and its analogs from pseudo steroidal sapogenin.

Moreover, the present invention shows unexpected results over the Tian publication. All examples in the Tian publication show that the process leads to a yield of lower than 60% and laborious purification step via chromatography. In comparison, the present invention achieves a yield of more than 84% in all examples with simple workup and rather complete conversion. The claimed invention provides a cleaner and simpler process that is suitable for manufacture on an industrial scale. Since the claimed invention as set forth in the amended claim 1 is patentable over the cited prior art, claims 2-12 that depend on claim 1 are patentable as well. Accordingly, the rejection has been overcome.

In view of the foregoing, Applicants have overcome all objections and rejections and claims 1-12, as amended, are in condition for allowance.

Three-month extension fee of $555 is required for this response. Please charge the fee and any other required fee to Deposit Account No. 50-2586 and notify Applicants' attorney.

Respectfully submitted,
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